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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/007,356	11/05/2001	Constantinos Tsouris	6321-210	3575

7590 11/14/2003

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EXAMINER	
SORKIN, DAVID L	

ART UNIT	PAPER NUMBER
1723	

DATE MAILED: 11/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No. 10/007,356		Applicant(s) TSOURIS ET AL.	
Examiner David L. Sorkin		Art Unit 1723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
 - 4a) Of the above claim(s) 14-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 24-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 November 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 - Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 - Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some * c) ☐ None of:
 - 1. ☐ Certified copies of the priority documents have been received.
 - 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 - * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
 - a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 1-13, in the response filed 27 October 2003 is acknowledged. Claims 14-23 remain withdrawn from consideration as non-elected.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the power supply comprising "two independent voltage sources", the "structure to propel", the "pressure source", and the "electrodes disposed at an entrance of said inlet and an outlet of said mixing channel" must be shown or the features canceled from the claims. No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-13 and 24-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably

convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention:

- a. Regarding claims 1-13 and 24-32, while it is not particularly clear what the scope of "said electrodes having different geometries" is, there is no support for this new limitation in the specification as originally filed. While page 12, lines 1-2 state "[c]hannel geometries need not be equivalent to one another", nowhere is it stated that the *electrodes* have different geometries.
- b. Further regarding new claim 26, there is insufficient support for the new limitation, "a spacing distance is less than 25 μm ". While an example of the electrodes being spaced apart by 25 μm is provided on page 13, line 19 and page 14, line 2 and an example of 450 μm is provided on page 17, line 10, nowhere is it stated that the distance is *less than* 25 μm and all examples provided are greater than or equal to 25 μm , with examples ranging from 25 μm to 450 μm .
- c. New claim 29 is further considered not to comply with the description requirement of section 112, first paragraph for the following two reasons:
 - i. the specification does not describe electrodes in the locations required by the claim.
 - ii. the specification does not describe "structure to propel..." which comprised the electrodes required by the claim.

- d. Further regarding new claim 30, there is no support for the new limitation, "said electrodes have different surface areas". The surface area of electrodes is simply not discussed at all in the specification as originally filed.
- 5. Claims 1-13 and 24-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention:
 - a. Regarding claims 1-13 and 24-32, the scope of "said electrodes having different geometries" is unclear.
 - b. There is lack of antecedent basis for "said two independent voltage sources", recited in claim 32. Perhaps claim 32 should depend from claim 10 rather than claim 1.

Claim Rejections - 35 USC § 102

- 6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

- 7. While it is unclear what is being claimed, as discussed above with regard to section 112, second paragraph, the claims have been considered with regard to the prior art to the extent possible.
- 8. Claims 1-3, 5, 6, 8-13, 27, 29, 31 and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Kopf-Sill et al. (US 5,842,787). Regarding claim 1, Kopf-Sill ('787) discloses a microchannel mixing device for electrohydrodynamic mixing of fluids

comprising a microscale mixing channel (104, 110, 116, 118 or sub-portion thereof) having an inlet (for example at 108) for receiving at least one fluid; at least one supply channel (see the supply channels in Fig. 1, one extending from each of 112, and 114 to intersection 108), and at least two electrodes, wherein at least one of said electrodes is disposed in said mixing channel (see col. 4, lines 45-55). While it is not clear what the scope of "said electrodes having different geometries" is, applicant states in applicant's remarks, "The electrodes have different geometries, such as different surfaces areas or orientations. The differing geometries provide a non-uniform electrical field". The electrodes of the reference have different orientations in that they are oriented at opposed ends of the mixing channel as seen in Fig. 1. A non-uniform field is produced by the electrodes (see for example col. 9, lines 49-56). Regarding claim 2, said at least one supply channel comprises a first supply channel for a first fluid and a second supply channel for a second fluid (see the supply channels in Fig. 1, one extending from each of 112 and 114 to intersection 108). Regarding claim 3, at least one of said electrodes is disposed within said first or second supply channels (see col. 4, lines 54-56). Regarding claim 5, said mixing device further comprises a cover plate in contact with a substrate (see col. 3, lines 19-35). Regarding claim 6, said mixing channel and supply channel are formed in said substrate (see col. 3, lines 19-35). Regarding claim 8, the substrate comprises silica or glass (see col. 3, lines 48-55). Regarding claim 9, the device comprises a power supply for applying voltage to the electrodes (see col. 9, lines 18-26). Regarding claim 10, said power supply comprises at least two independent voltage sources (see col. 9, lines 24-26). Claim 11 fails to further structurally limit the

claimed apparatus because the claim only discusses a reaction that may occur during an intended operation involving intended contents of the claimed device. As held in *Ex parte Thilbault*, 164 USPQ 666, 667 (Bd. App. 1969) "Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim". Also, "the manner or method in which such machine is to be utilized is not germane to the issue of patentability of the machine itself" *In re Casey*, 152 USPQ 235 (CCPA 1967). Regarding claim 12, the electrodes are at each end of the mixing channel. As explained in col. 9, lines 18-26, the voltage controller may provide a different potential to the electrode of each port/reservoir. Therefore the device may be operated in the manner stipulated in claim 12, having an electric field oriented substantially parallel or anti-parallel to a direction of flow of said fluid in said mixing channel, by applying a potential difference between the ends of the mixing channel. Regarding claim 13, electrodes are positioned (at 114 and 116) transverse to a length of said mixing channel. A potential difference may being applied between the electrodes to produce an electric field transverse to a direction of flow of fluid in the mixing channel (see col. 9, lines 18-26). Regarding claims 27 and 29, electrodes are disposed at an entrance of an inlet (see col. 4, lines 45-48). Regarding claim 31, two of said electrodes are disposed in said mixing channel (at 110 and 116). Regarding claim 32, said two independent voltage sources are capable of providing opposite polarities (see Fig. 3; col. 7, lines 23-66, col. 9, lines 18-30).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kopf-Sill et al. (US 5,842,787) in view of Anderson et al. (US 5,922,591). The device of Kopf-Sill ('787) was discussed above with regard to claim 1; however, a gas permeable cover plate is not disclosed. Anderson ('591) teaches a gas permeable cover plate (see col. 29 line 23 to col. 31 line 9). It is considered that it would have been obvious to one of ordinary skill in the art to have provided the device of Kopf-Sill ('787) with a gas permeable cover plate, because Anderson ('591) explains that such a gas permeable cover plate provides the benefit of releasing dissolved or trapped gas, which Anderson ('591) explains is especially important in devices with channels of small dimensions.

11. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kopf-Sill et al. (US 5,842,787). The device of Kopf-Sill ('787) was discussed above with regard to claim 1. It is considered that col. 3, lines 1-10 and col. 15 lines 11-38 would have suggest the claimed ranges of claims 24-26 to one of ordinary skill in the art.

12. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kopf-Sill et al. (US 5,842,787). The device of Kopf-Sill ('787) was discussed above with regard to claim 1; however, Kopf-Sill ('787) does not explicitly disclose electrodes having "different surface areas" as required by the claim. Because the claim is apparently open to any

difference in surface area, it is considered that it would have been obvious to one of ordinary skill in the art to have made the surface areas of the electrodes at least slightly different, to avoid the prohibitive effort of making the electrodes have precisely the same surface area. See also *Gardner v. TEC Systems, Inc.* 220 USPQ 777 (Fed. Cir. 1984) regarding the obviousness of differing relative dimensions.

Response to Arguments

13. Applicant begins remarks by with a "review of the claimed invention". Applicant discusses electrode surface area, non-uniformity of electric field, and low Reynolds Number. None of this information was discussed in the specification as filed. The examiner also notes that two identical electrodes also produce a non-uniform field (see Figs. 23-11 and 23-12 of Fishbane et al.). Also, Kopf-Sill et al. (US 5,842,787) explicitly discloses a non-uniform field in, for example, col. 9, lines 49-56).

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

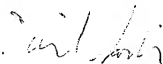
Any inquiry concerning this communication or earlier communications from the examiner should be directed to David L. Sorkin whose telephone number is 703-308-1121. The examiner can normally be reached on 9:00 -5:30 Mon.-Fri..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L. Walker can be reached on 703-308-0457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



David Sorkin



CHARLES E. COOLEY
PRIMARY EXAMINER